Reflections

By Bill Robertson Ch RE RAN

Commencing late 1945, I did my initial training at F.N.D. (HMAS *Cerberus*) as an Ordinary Seaman, then carried on to the Gunnery School where I qualified as a Radar Control Rating (Third Class). Later I completed another Gunnery School course, complete with the dreaded commando section at the Hann's Inlet Rifle Range. This was followed by the Radar training at H.M.A.S. *Watson*, where we were introduced to mainly Type 285, Type 282, and the Operator's control panels for same, namely Panel L24 for 285, and L22 for 282.

Type 285 and Type 282 had identical Transmitters and Receivers. The main difference was in their Aerial arrays. 285 had five "Pig-Trough" reflectors mounted side by side with two Yagi arrays side by side in each reflector. Each Yagi consisted of one driven dipole and six or seven director dipoles in front. Type 282 had only three Pig-Trough reflectors as it was mounted on a smaller director tower. The signal to and from the driven elements passed through a “beam splitter” arrangement which was motor driven and incorporated a “Maltese Cross” mechanism which gave a small phase shift to the centre dipole cluster. This shifted the beam slightly from side to side, so that only a target which was in the very narrow overlap area of the two transmitted lobes would return equal strength signals from each lobe.

The C.R.T. "A" scan in front of the operator had a small shift applied to it which shifted the displayed echo from the right lobe to the right on the display so the echoes appeared side by side with a slight overlap. The two echoes from the same target then gave the operator the clue of which way the aerial had to be turned to line up the target to within half a degree of the centreline of the aerial. The rule was, train the Director (on which the Aerial was mounted) toward the weakest echo. The "A" Scan was an Admiralty pattern watertight rectangular box designed, so I believe, to take a direct hit from a 15 inch shell, and was heavier than I care to remember. The A scan was of course painted blue, and was mounted in the director tower immediately in front of the Trainer, positioned so it was almost impossible to access for servicing.

The Trainer knew which of the echoes on his screen was the one he was supposed to be concentrating on because the operator of the L24 / L22 panel in the Gunnery Control Centre had positioned a strobe over the echo on his screen (from which he was passing range of target information to the guns) and this also brightened the echo at that range on the trainer's display.
A well trained operator could also monitor the splashes from the shells which missed the target (most of them!) and call the "fall of shot" to the Gunnery Officer, as he could clearly see if they were ‘over’, ‘short’, ‘left’, or ‘right’ .

After a practical course on H.M.A.S. *Murchison* I became a second class RC rating, crossed guns on right arm and all! That was when I saw the light, and shortly afterward I was on my way to H.M.A.S *Torrens* to join the exalted ranks of the R.A.N. Radio Mechanics. On completion of training at "*Torrens*" it was back to "*Watson*" for me. There I was introduced to the mysteries of A276, A286, 285 with which I had some previous non technical experience, Air warning Type 79 and 281, Type 277, and Type 293. We also covered Loran and a 10 cm Radar jamming device which I am pleased to say I never saw again.

At the end of that course I was posted to H.M.A.S. *Shoalhaven*, a River class Frigate, sister ship to *Murchison*, so I had a pretty good idea of what Radar I would find aboard.

Air	Warning	A286
Surface	Warning	A276
Gunnery	Control	285
IFF	242	
A286	A scan display only.	
A276	A scan display and AWA PPI in Radar Office	
	Remote AWA PPI on the Bridge	
	Admiralty type PPI in Operations room	
285	A scan in Radar Office	
	L 24 Panel in Transmitting Station (A scan)	
	A scan in Director Control Tower.	

Two years later nothing had changed except that we had replaced the A scan in the director control tower with a much lighter unit which fitted over the Trainer's binoculars and allowed a 1 inch A scan to be viewed through the right lens when required.

One of the problems with Type 285 was with moisture finding its way into the beam-switching unit and the inch diameter cables, some rigid lead covered, some flexible, which fitted into the device. Regular insulation tests gave warning when these cables had to be removed and dried. The unit itself more often than not also had to be dried out. When all was dry the whole lot had to be re-assembled, the connecting glands packed with lead wool, and tightened up. My offsider, Bill Grant and I were nearly finished this operation one day when it started to rain. To save a couple of day's hard work I sent Bill down to the Sickbay to see the Sickbay Attendant for a handful of condoms which we placed over the ends of the cables and over the connecting glands. About an hour later the Captain sent for me to report to him on the bridge. Pointing to our recently fitted protective coatings he asked me if what he was pointing at was what he thought it was. I explained the situation and emphasised that this was a short term measure which had proved highly effective in keeping everything bone dry. His reply was that our initiative was highly commendable, but as we were entering harbour at first light the following morning I had better start praying for the rain to cease so that we could finish the job, as if he found things looking the same the next morning he would personally place the offending objects where the sun would never shine on them again. I assured him that the message had been received loud and clear. Never had two R.E.s worked so fast when the rain stopped.

Back to "Watson" for an extended stay. I think it was one week! Then it was H.M.A.S. *Hobart*. *Hobart* had one Type 285, one Type 284, must have been six Type 282, one 277, one 293, one 281 and a brace of IFFs. At one time the 284 was due to be replaced by 274. The gigantic parabolic cheese type 10 cm antenna arrived, but that is as far as it got. The antenna was never fitted to the director, and as far as I can remember the electronics never materialised.

All the equipment and displays were standard Admiralty pattern. The one unusual item was in the plotting room. This was a Skiatron. This was a PPI with a high intensity tube which painted echoes a violet colour. The picture on the tube face was projected onto a plotting table from below, via a front silvered mirror, enabling plots to be made directly on the table. I have good reason to remember some of the gear on Hobart as eventually I wrote out the return notes Form AS 331 for every single item on the Electrical Officer's Establishment list and returned the lot to Leichhardt Stores.

By now it was time for another trip to "*Watson*" for a Radar to W/T conversion course. This was to bring us uneducated Radar types into the world of wireless telegraphy. Who the "powers that be" thought had been servicing all the W/T gear on the ships we had been on still leaves me wondering.
We were also brought up to date on Radar type 960 and a few other things. Now that 1 was "full bottle" on all the latest equipment I was posted to a ship where all this new knowledge could be put to good use, H.M.A.S. *Cowra*.

Cowra was a minesweeper, fitted with A276 and nothing much else. I think the radio gear was left over from World War 1. To add insult to injury the ship had been payed off a couple of years before and had been in a state of preservation..... or rather it SHOULD have been in a state of preservation! In truth it was in a state! Some dingbat who shall remain anonymous had used trays of Calcium Chlorate in lieu of Silica Gel to dehumidify the sealed Radio and Radar offices.
Anything which was made of copper and was not plated in some way had stalactites of green corrosion hanging off it. This made tuning the old AWA W/T Transmitter an interesting experience. Strangely the Radar gear was not badly affected. I eventually stripped the AT13C HF Transmitter down completely whilst in dry dock at Williamstown and had every piece of metal in it silver-plated. After that all was well! Our 500 kH emergency transmitter incidentally was of the spark-gap type, and the emergency receiver was a crystal set! After twelve months on "*COWRA*" I was transferred to "*BATAAN*", one of the three TRIBAL class destroyers built at Cockatoo Docks in Sydney Harbour.

BATAAN was not fitted with the most modern Radar either! The surface warning Radar was an American set S.G. (SUGAR GEORGE). The Long range warning set was S.C. (SUGAR CHARLIE). There was also an I.F.F. set type B.N.. S.G. had an A scan in the Radar Office. This was later supplemented by a PPI display (which I wired up as a "HOT SPARE" quite illegally), as the Display unit on the open Bridge tended to become temperamental when salt water

leaked in through the top panel and dribbled over the components. The approach to repairing this particular piece of electronics was somewhat unusual. When the unit was removed from its housing and taken below, still with salt water dripping from it, it was taken directly to the P.O.'s bathroom where it was placed under a warm shower and thoroughly rinsed out to remove any salt. After a couple of days in the Radar office to dry out it usually worked when switched on without any problems other than the odd resistor burning out once in a while. The thought of what this might be doing to the bearings in the deflection coil assembly worried me for a while until I discovered that the bearings were made of GLASS. I had not seen this before nor have I seen it since. It certainly overcame the strange effect caused when steel deflection coil bearings became magnetised and caused echoes to jitter about on the display as the trace rotated.

S.G. also had a PPI in the Operations Room. S.C had a larger PPI in the Operations room and must have had an A scan somewhere near the receiver which was in an annexe off the Ops room but I have no recollection of it whatever. The BN interrogator/ IFF was also in the annexe.

The Type 285 was in the Radar office with the SUGAR GEORGE. There was an A scan in the Office, an L24 panel in the T.S. and an A scan in the Director control tower. BATAAN was later refitted with Air warning type 293 in lieu of S.C. and a Commercial 3cm surface warning set in lieu of S.G.

On sea trials following this refit we had an interesting experience with a complete failure of all the new equipment. We had carried out an emergency full-astern exercise with a following breeze.
When trouble shooting we found that there were multiple earths on cables which ran up the aft end of the lattice mast. A post-mortem on these cables showed that the heat from the exhaust gases from the forward funnel had melted the polythene insulation inside the co-axial cables, the heat had caused the inner conductor to expand and to contact the outer conductor causing the short-circuit. The polythene had then set when it cooled leaving the conductors in this shorted state.
We had a quick trip to Williamstown dockyard to have all the affected cables renewed and an asbestos deflector plate fitted to the cable trays.

I encountered one most peculiar problem with 285 on BATAAN, thanks to Garden Island Dockyard. The receiver tuned up pretty well before we left the Island after a minor refit.There were echoes every where from the land, and it was not until we cleared the heads that I ventured up to the Director Control Tower to check the display up there, and found that something was amiss.
I trained the aerial on a passing ship and received no echo! It was some time before I found that a very good echo of the passing ship could be obtained by training about 30 degrees either side of it. Quite some time later whilst sitting on top of the Yagi array I noticed that the Part Number of the dipole assemblies could be seen on the upper part of all except the two central units.
Whilst I had been on leave, unknown to me Dockyard had replaced all the dipole units carefully installing the two central units upside down. This produced two transmitted lobes about 60 degrees apart, each nicely beam-switched As a result it was possible to obtain a very accurate bearing on a target which was actually at 30 degrees to the direction the aerial was pointing. This took about two minutes to rectify but I confess to taking a bit longer to find what was going on.

You may be aware that *BATAAN* and *VENGEANCE* had a collision a couple of hundred nautical miles North West of Darwin whilst we were refuelling from the carrier after escorting the Queen (in the *GOTHIC)* from Fremantle on her way home after a royal visit. After *BATAAN* managed to disengage from this dingle we were minus a few feet of the bow and the upper-deck superstructure on the Port side had suffered some unsolicited panel-beating. There were also some other strange things which were duly reported in our damage report but quite how significant they were was not appreciated at the time. The duty operators of the 293 reported having to shut down the transmitter due to loud arcing and sparking from the waveguide in the Radar room. This was found to be caused by the normal 3/16 inch gap in the waveguide at the transmitter end having closed up. Some force and readjustment of mounting hardware was required to restore the gap. All the main radio aerial leads had to be lowered to the deck and shortened by about a foot or more as they had stretched, and were obviously sagging. The next

time we were in dry dock it was found that the keel was twisted. That could not be rectified and *BATAAN* was paid off.

For some strange reason I thought that a draft to my Home Port would be in order but that was not to be. Just so that I would not get to like the feel of dry land Navy Board sent me to HMAS *PLATYPUS* for the ten days I had to wait for HMAS *SYDNEY* to berth.

Sydney was fitted with Type 960 long range Air warning Radar, Two type 277 close range Air warning sets, one forward and one aft of the island. One type293 and one commercial 3cm surface warning (of the same type fitted to *BATAAN* and whose number I have forgotten) There was also an air branch maintained C.C.A. (Carrier Controlled Approach) Radar mounted aft.

Our own close range Radar proved far more effective for controlling aircraft landings and the CCA set was removed. We had one STAAG mounting Twin 40 mm AA controlled by Radar type 262.
Most of the displays from these Radars were mounted in two adjoining rooms, the names of which escape me for some reason. These rooms were the only part of the ship which had really good air-conditioning. On a couple of occasions in the tropics the air-conditioning broke down. Some bright spark each time opened the outside doors to let some fresh air in. Probably for some selfish reason he thought he should be allowed to breathe. Lovely cold PPI s, lovely humid air, lovely high voltages lots of lovely condensation. Loud bangs, sparks, smoke and a Chief RE with at one time twelve unserviceable PPI s within five minutes. This is not a good feeling.

When *SYDNEY* went into refit to become a troop transport I was sent at last to my Home Port to serve out my last two years. Was I, Like hell I was! It was off to The L school at FND to lecture on Auto Acquisition Fire Control Radar! If you would like to know how Conical Scanning is achieved or how the Radar controls the hydraulics of a STAAG mounting to search for and lock on to a target and track it just ask me. It will take another page or two. Perhaps some other time.